

Title (en)  
METHOD OF MANUFACTURING ANNEALED WAFER

Title (de)  
VERFAHREN ZUR HERSTELLUNG EINES GETEMPerten WAFERS

Title (fr)  
PROCÉDÉ DE FABRICATION D'UNE TRANCHE RECUITE

Publication  
**EP 2659032 A1 20131106 (EN)**

Application  
**EP 11796952 A 20111205**

Priority  
• JP 2010294539 A 20101229  
• EP 2011071736 W 20111205

Abstract (en)  
[origin: WO2012089441A1] Method of Manufacturing Annealed Wafer To provide a method of manufacturing an annealed wafer capable of avoiding residual voids after annealing and deterioration of TDDB characteristics of an oxide film formed on the annealed wafer, and extending the range of nitrogen concentration that can be contained in a silicon single crystal. In a method of manufacturing an annealed wafer, crystal pulling conditions are controlled such that a ratio V/G between a crystal pulling rate V and an average temperature gradient G in a crystal growth axis direction is not less than  $0.9 \times (V/G)_{crit}$  and not more than  $2.5 \times (V/G)_{crit}$ , and a hydrogen partial pressure within a crystal pulling furnace is set to not less than 3 Pa and less than 40 Pa. A silicon single crystal has a nitrogen concentration of more than  $5 \times 10^{14}$  atoms/cm<sup>3</sup> and not more than  $6 \times 10^{15}$  atoms/cm<sup>3</sup>, and a carbon concentration of not less than  $1 \times 10^{15}$  atoms/cm<sup>3</sup> and not more than  $9 \times 10^{15}$  atoms/cm<sup>3</sup>, and heat treatment is performed in a noble gas atmosphere having an impurity concentration of not more than 5 ppma, or in a non-oxidizing atmosphere.

IPC 8 full level  
**C30B 15/20** (2006.01); **C30B 29/06** (2006.01); **H01L 21/02** (2006.01)

CPC (source: EP KR US)  
**C30B 15/20** (2013.01 - KR); **C30B 15/203** (2013.01 - EP US); **C30B 29/06** (2013.01 - EP KR US); **H01L 21/02664** (2013.01 - US)

Citation (search report)  
See references of WO 2012089441A1

Designated contracting state (EPC)  
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

DOCDB simple family (publication)  
**WO 2012089441 A1 20120705**; CN 103237930 A 20130807; CN 103237930 B 20151021; EP 2659032 A1 20131106; EP 2659032 B1 20150211; JP 2012142455 A 20120726; JP 2014507366 A 20140327; JP 5678211 B2 20150225; KR 101532154 B1 20150626; KR 20130099216 A 20130905; MY 164264 A 20171130; SG 191177 A1 20130731; US 2013273719 A1 20131017; US 8835284 B2 20140916

DOCDB simple family (application)  
**EP 2011071736 W 20111205**; CN 201180056597 A 20111205; EP 11796952 A 20111205; JP 2010294539 A 20101229; JP 2013546641 A 20111205; KR 20137019517 A 20111205; MY PI2013002193 A 20111205; SG 2013046131 A 20111205; US 201113977497 A 20111205